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ABSTRACT

The functional relationship between levels of academic survival skills (class behavior) and academic reading achievement of low-achieving students was investigated. Ss were 18 first grade children from three regular classes, one of which was designated as control (N=6) and the other two as experimental (N=12). Teachers were trained in the use of reinforcement techniques to increase Attending, Working, and Volunteering behaviors and decrease Looking Around by students. Reading achievement was tested prior to, immediately following, and 4-6 weeks after the intervention period of 20 school days. Observations of class behavior using a sequential coding system were made during the same weeks of achievement testing. Results showed that the intervention procedures were effective in increasing experimentals' academic survival behaviors, that the gains were maintained during the followup period, and that the behavior gains were indeed related to gains in reading achievement. For both groups, behavioral changes (gains or losses) between each assessment period were reflected in concomitant achievement changes. (KW)

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EFFECTS OF ACADEMIC SURVIVAL SKILL TRAINING ON LOW ACHIEVING FIRST GRADERS

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Program II, Prevention and Remediation
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EFFECTS OF ACADEMIC SURVIVAL SKILL TRAINING ON LOW ACHIEVING FIRST GRADERS

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In several studies, behavioral researchers have demonstrated that children's inappropriate classroom behavior can be decreased and replaced with incompatible response classes presumed to be more effective for learning in an academic setting. Encouraging effects have been obtained with a variety of different techniques manipulating variables such as teacher attention and praise (Becker, Madsen, Arnold, & Thomas, 1967; Hall, Lund, & Jackson, 1968; Madsen, Becker, & Thomas, 1968), token economies (Hewett, Taylor, & Artuso, 1969; Hops, 1971; Kuypers, Becker, & O'Leary, 1968; Walker, Mattson, & Buckley, 1971), self-reinforcement (Bolstad & Johnson, 1971), and individual (Cobb, Ray, & Patterson, 1971; Patterson, Shaw, & Ebner, 1969), and group (Lovitt, Guppy, & Blattner, 1969: McAllister, Stachowaik, Baer, & Condermon, 1969; Packard, 1970; Schmidt & Ulrich, 1969) contingencies. However, relatively little has been done by way of showing that increases in such response classes directly result in increased academic performance, per se. The present paper reports an experiment designed to demonstrate a causal relationship between classroom behavior and achievement.

Some researchers have begun to define relationships between precise categories of classroom behavior and academic achievement by using correlational methods. They have found a strong relationship between behavioral measures and academic achievement as measured by standardized tests (Lahaderne, 1968; Meyers, Atwell, & Orpet, 1968). In samples of first- and fourth-grade children, Cobb (1969, 1970, 1972) found a consis-

tent relationship between the students' performance on achievement tests and such behavioral classes as attending to teacher, following teacher instructions, and volunteering to answer academic questions. Those behavioral correlates of achievement were presumed to be academic survival skills which may be necessary, but not sufficient, for successful academic functioning. They were not academic behaviors, per se, but conceptualized as the first components in a sequence of correct academic responding; e.g., a child cannot read correctly or at a high rate unless he begins looking at his book. Since the results of these studies consistently pinpointed, on a correlational level, a relationship between behavior and achievement, the next step was to determine if a causal relationship existed between academic survival behaviors and achievement.

The present study was the first in a series designed to investigate the functional relationship between levels of academic survival skills and academic reading achievement of low-functioning children in regular classrooms. Packard (1970), Patterson, Cobb, & Ray (1972), Walker, Fiegenbaum, & Hops (1971), and Walker, Mattson, & Buckley (1971) demonstrated clearly that changes in appropriate classroom behaviors can be obtained. It was hypothesized, therefore, that intervention procedures based upon these researchers' work would significantly increase the survival skill level of experimental versus control children.

Cobb, Ray, & Patterson (1971) and Walker & Buckley (1972) indicated that probabilities of behavioral changes maintaining after intervention can be increased if social agents have been involved in the intervention procedures. In the present study, teachers were trained in the use of new social behaviors as part of the intervention strategy. While no

hypotheses regarding specific intervention components were tested, it was hypothesized that, as a result of the entire intervention program, the survival skill behaviors acquired during intervention would be maintained during the follow-up period.

In addition to replicating previous findings that scholastic performance of lower socioeconomic status (SES) first graders is below that of higher SES children, Cobb (1970) found that survival skill levels differed for the groups in the predicted direction, i.e., lower SES children exhibited smaller percentages of the behaviors in the classroom setting than was true for higher SES children. The latter finding was expected since the lower class, in comparison with the upper class, home environment is less likely to provide training in academic survival skills (Zunich, 1962). It was suggested that the lower SES children's lack of training led to the low survival skill level in the classroom and was a major reason for poor academic performance rather than some other factors, e.g., intellectual ability. Minde, Lewin, Weiss, Lavigeur, Douglas, and Sykes (1971) demonstrated that hyperactive children, handicapped by their persistence in exhibiting inappropriate classroom behaviors, did perform significantly poorer academically than other students of the same intellectual ability. Using these and other findings as a rationale, the authors' third hypothesis was formulated. Pupils receiving survival skill training would make significantly greater gains in reading achievement than control students.

Method

Subjects

The study was conducted in a school district of approximately 21,000

students. The subjects were 18 first-grade children from three regular classrooms whose teachers agreed to participate in the program. After observational and reading achievement data were collected, six children in each classroom who had low rates of academic survival skills combined with low scores on the standardized reading tests, relative to their classmates, were identified. One classroom was designated as control (N = 6) and the other two classrooms as experimental (N = 12).

Achievement Tests

The Gates-MacGinitie Primary A was administered prior to, immediately following, and approximately four to six weeks after intervention had been completed as part of an overall reading achievement battery. A mean of each child's standard scores on the two subtests, Vocabulary and Comprehension, was calculated for each administration.

Observations

Observations of classroom behavior using a sequential coding system (Cobb & Hops, 1971) were made during the same week in which achievement testing occurred. Children were observed during reading periods for five consecutive days. All pupils were observed sequentially; the observer coded the behavior of each student for two continuous eight-second intervals before going on to the next. Once the entire group had been sampled, the observer began the same sequence again so that each pupil was coded several times.

Cobb (1970) reported the survival skills, Attending (AT), Volunteering (VO), and Look Around (LO), as moderate correlates of first-grade reading achievement; r's = .45, .59, and -.41, respectively. For the current study, AT was redefined as two new, independent categories:

Attending (AT) and Work (WK). For each student, the frequency of LO was subtracted from the summed frequencies of AT, VO, and WK. The obtained figure was then divided by the total of all behaviors. The proportion represented the percentage of time the child engaged in survival behaviors during observations.

Observer reliability was calculated by dividing the total number of agreements by the total number of recorded behaviors. Observers were trained until they reached a reliability of 85%, or greater, with an experienced observer on three occasions. Four full-time and two part-time observers were used. Throughout this study, reliability data were collected systematically between various pairs of observers. The range was 85% to 99% with a mean of 94% based upon 19 paired observations.

Intervention

All of the intervention procedures took place in the regular classroom and were based on the work of Packard (1970), Patterson, Cobb, & Ray (1972), Walker, Mattson, & Buckley (1971), and Walker, Fiegenbaum, & Hops (1971). To train the teachers, the experimenters used modeling, cueing, daily feedback and social praise, all of which were faded out as the children's behavior became more appropriate. Readings were assigned which coincided with various aspects of the program. Components of the child training procedures taught to and employed by the teachers were group nonsocial reinforcement, individual and group social reinforcers, vicarious reinforcement, shaping procedures, close monitoring, pairing of social and nonsocial reinforcers, and the fading out of nonsocial reinforcers as the children progressed. The period of intervention was 20 school days.

Teacher Training

First session. Training of the teacher began after collection of the baseline data. The experimenter had the first meeting with the teacher after school in her classroom where all of the training took place. The concept of academic survival skills and its supporting research were presented. Each survival behavior was defined and modeled by the experimenter, and the teacher was asked to define the behaviors as they applied to her particular classroom. Relevant material on the rationale for observing behavior and for collecting baseline data were assigned from two programmed texts, Living with Children by Patterson & Gullion (1968) and Modifying Classroom Behavior by Buckley & Walker (1970). The reading assignments were chosen so that the next task in the training sequence was likely to be understood and completed satisfactorily.

Second session. At the second session, the teacher presented survival skill definitions that were applicable to her classroom. Clarification was provided when the experimenter anticipated that children might not understand the definitions. The teacher's comprehension of the previous reading assignment was tested verbally, and she was then asked to collect baseline data on the entire reading group for three days. A clock and light mechanism was explained and demonstrated using role-playing and modeling techniques. The teacher was taught to operate the mechanism by activating a switch at the end of an extension cord connected in series to a clock and green light. The clock provided the teacher, as well as the class, with an account of the number of minutes the entire class was engaged in appropriate behavior; the light provided a signal that the clock was operating.

Intervention procedures included programming of social and nonsocial reinforcers; so the teacher was given a second reading assignment to familiarize her with the concept of reinforcement. In addition, she was asked to prepare a list of potential nonsocial group reinforcers to be used following each intervention session. The assignments were to be completed for the next training meeting to be held after the three days of baseline data had been collected.

Third session. The teacher was verbally tested to determine whether or not she understood the previous reading assignment on reinforcement. The list of potential reinforcers, which included free time, extra recess, and academic games, was checked. The experimenter demonstrated, and the teacher practiced, the way to use contingent social praise and vicarious reinforcement and to ignore inappropriate behaviors.

The mean percentage of time all students were simultaneously exhibiting academic survival behavior for the three baseline days was calculated from the teacher's data. This mean figure became the criterion for reinforcement on the first day of intervention.

Consultation during intervention. Once the program had been introduced to the class, the experimenter observed and coded aspects of the teacher's behavior as she operated the clock and light device. After each period, the experimenter spent some time with the teacher going over the data collected on her behavior such as her rate of using vicarious or group reinforcement; her daily improvement as reflected in the data was praised. Monitoring and providing feedback to the teacher by the experimenter was rapidly faded so that during the last two weeks of the 20 school day program, the experimenter was in school only once.

The total amount of time spent by an experimenter with each teacher was approximately 12 hours.

Child Training

After three days of baseline data had been collected by the teacher, the program was explained to the children. They were told of the classroom behaviors that had been defined by the teacher and experimenter. It was pointed out that they could learn better by performing these behaviors and a program was being introduced to help them accomplish this goal. In one class cartoons depicting the survival behaviors were made and in the other class the list of behaviors was placed on colored construction paper; both of these were prominently displayed during the intervention phase.

The experimenter helped the teacher explain the operation of the clock and light device to the class. He role-played appropriate and inappropriate behaviors while the teacher operated the mechanism.

The children, and especially the low-functioning children, were asked to contribute to the list of group reinforcers previously made up by the teacher. They were told one of their choice would become available each time they reached the criterion.

Just prior to the beginning of each intervention period, a colored strip of paper was placed at the criterion point on the clock. For those children lacking an adequate time concept, the paper simplified understanding of the daily requirement.

During the first day of intervention, the experimenter occasionally approached a child who was exhibiting inappropriate behaviors to help teach the relationship between behavior and the running of the clock and

light. This teaching seemed necessary as many children recited what the survival behaviors were and stated that certain behaviors kept the clock and light device from operating, but they did not relate their behaviors to the operation of the device. Once the relationship had been demonstrated a few times, further reminders were unnecessary.

Each day the criterion for reinforcement was determined by the number of minutes accumulated on the previous day. When the children reached the criterion for a day, the same amount of time was required in the following day. If the children surpassed the required amount of time, then the new time established was used the following day. They were never asked to perform better than they had previously demonstrated they could do. If they failed to meet the criterion, it remained the same; if they failed on two consecutive days, it was dropped back to the previous level.

During the first week, the children were awarded their group reinforcer immediately after each session providing they had met the criterion set for that day. Later on, the criterion had to be met for more and more sessions before a reinforcer was available. The final requirement was five successfully completed days. On the last occasion, however, the reinforcement was of greater magnitude, e.g., a field trip. This reinforcer ended the intervention phase, and it was anticipated that the teacher training in social praise and management techniques would maintain the children's behaviors.

Results

The first hypothesis related to the effectiveness of the intervention procedures in increasing survival skill behaviors. Figure 1 shows that the experimental children increased their level of survival skills

from a mean proportion at baseline of .49 to .61 immediately following intervention, an increase of 24%, while the controls who began considerably higher, .62, remained at approximately the same level during the same period, showing a gain of only 3%.

Of more practical importance, however, was the second hypothesis regarding the maintenance of survival skills 4-6 weeks after the post-intervention assessments. Figure 1 demonstrates that the 12 experimental children maintained and, in fact, increased the gains made during intervention; their mean proportion at follow-up was .63. In contrast, the control children showed a 16% decrease from the post-intervention level, dropping from a mean proportion of .64 to .54.

Statistical analysis of the survival skill data across the baseline, post-intervention, and follow-up phases was carried out using a two way analysis of variance with repeated measures on one factor (Winer, 1962, p. 302). The results shown in Table 1 indicated that significant treatment ($p < .005$) and interaction ($p < .001$) effects were obtained. These findings supported the hypotheses that the intervention procedures would be effective in increasing the level of survival behaviors for the experimental group and that the gains would be maintained during the follow-up phase.

A question regarding the marked differences in the initial status resulted in a further analysis of the survival skill data. When the control and experimental groups' scores on the criterion differ initially, problems of interpretation may arise from using the repeated measures ANOVA (Werts & Linn, 1971). To circumvent this problem, initial differences were controlled by comparing two groups matched on their initial

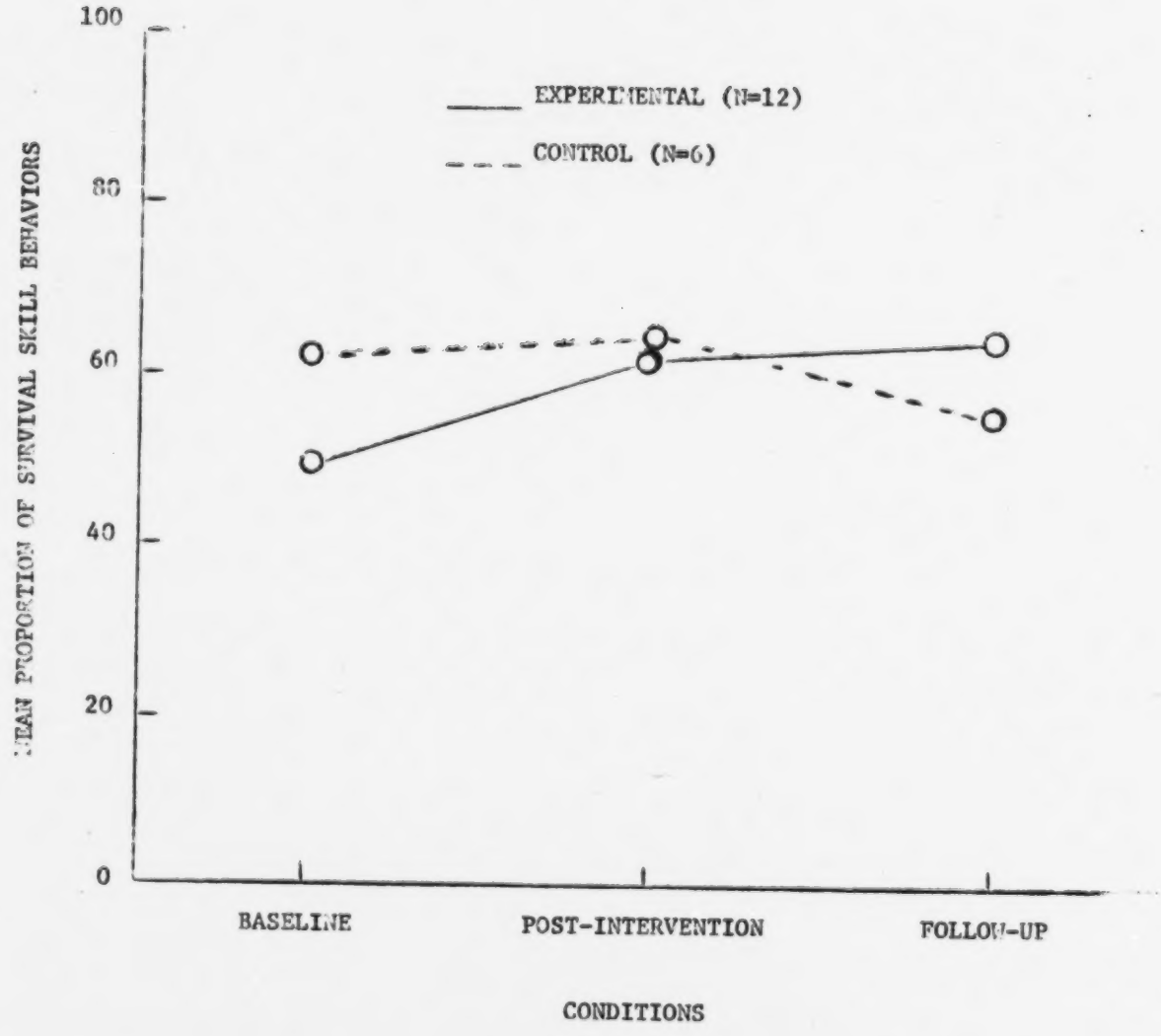

Fig. 1. Mean proportions of survival skills (AT + WK + VO - LO) at baseline, post-intervention, and follow-up for experimental and control students.

TABLE 1

Analysis of Variance with Repeated Measures for Proportion of Survival Skill Behaviors (AT + WK + VO - LO) at Baseline, Post-Intervention and Follow-Up for Experimental and Control Students

Source	df	MS	F
Between Subjects			
Groups (A)	1	.008	< 1
Error Between	16	.034	
Within Subjects			
Treatments (B)	2	.040	6.41*
A X B	2	.055	8.85**
Error Within	32	.006	

* $p < .005$
** $p < .001$

levels of survival skill behaviors. As shown in Table 2, four control subjects with a mean proportion at baseline of .57 (SD = .04) were compared to six experimental subjects with a mean proportion of .56 (SD = .02). The results of the repeated measures ANOVA clearly substantiated the findings based on the larger sample.

No major changes were noted in the control group while the experimental group showed a steady increase, from .56 during baseline to .67 at post and to .73 during follow-up. The results were statistically significant for both treatment ($F = 5.44$, $df = 2/16$, $p < .025$) and interaction ($F = 3.80$, $df = 2/16$, $p < .05$) effects.

The direct causal relationship between the changes in levels of survival skills and changes in achievement scores was the third hypothesis to be tested. While the survival skill data demonstrated that behavior could be altered and maintained, the major question was the effect of such changes on reading achievement. As shown in Figure 2, the mean standard score of reading achievement for the 12 experimental children increased from 38.0 at baseline to 48.6 immediately after intervention, an increase of 28%. A further increase of nine percent over the post-intervention level resulted in a mean score of 52.8 at follow-up. The control group, in contrast, gained 11%, increasing from 40.7 to 46.1 during the intervention period, and only four percent more during the last phase of the study, with a follow-up mean of 47.8. The experimental children, beginning at a somewhat lower level than the controls, surpassed them on the post measure and continued to show greater gains during follow-up.

The changes in reading achievement were found to be statistically

TABLE 2

Mean Survival Skill Levels of Matched Experimental and Control Groups During Three Time Periods

		Baseline	Post-Intervention	Follow-Up
Controls	$\bar{X}$	.57	.60	.56
(N = 4)	SD	.04	.18	.10
Experi-mentals	$\bar{X}$	.56	.67	.73
(N = 6)	SD	.02	.13	.08

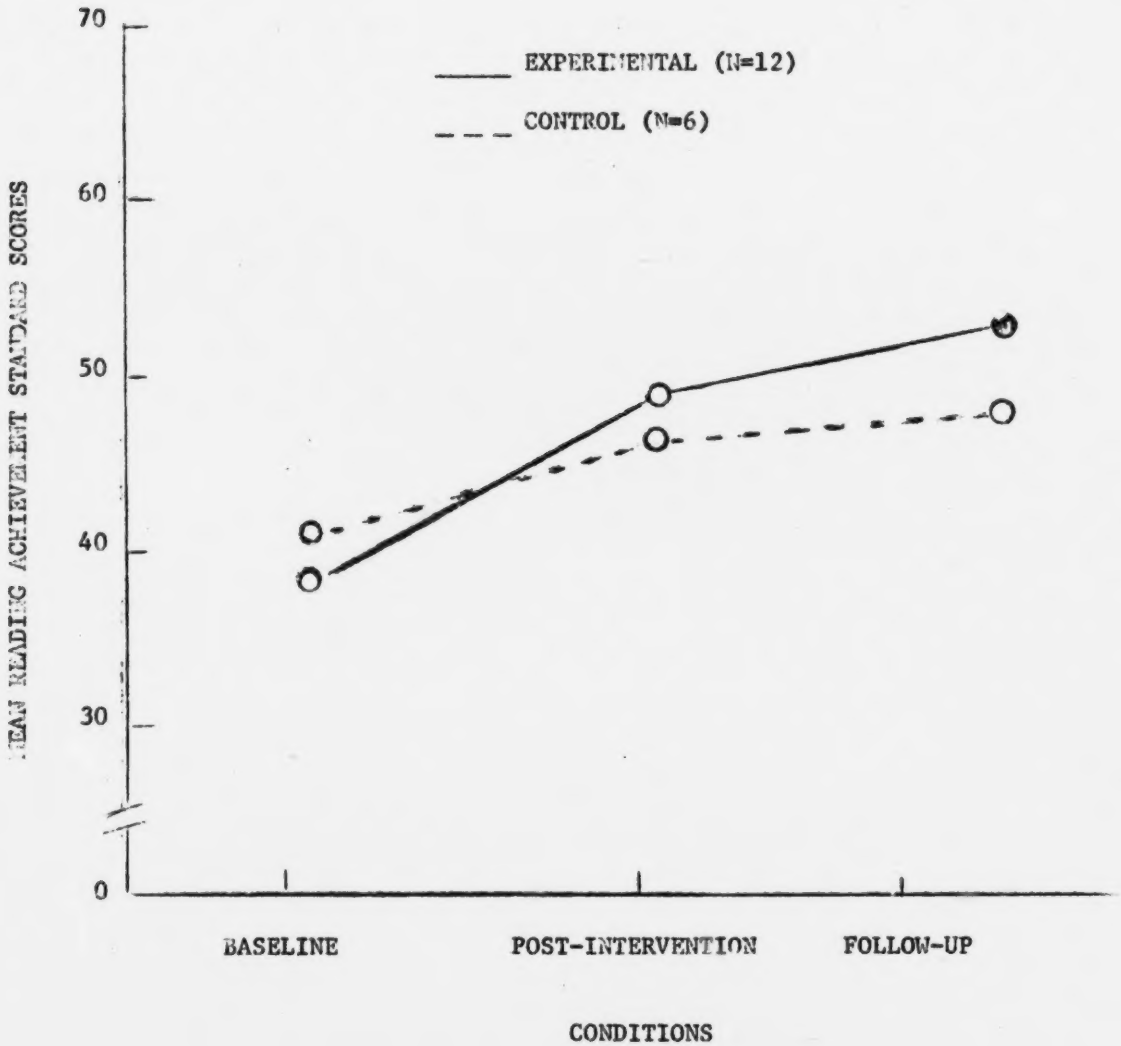

Fig. 2. Mean standard scores on the Gates-MacGinitie Primary A at baseline, post-intervention, and follow-up for experimental and control students.

significant as presented in Table 3; treatment and interaction effects were significant at the .0005 and .05 levels respectively. Both groups gained over the course of the study: however, the substantial gains made by the children in the experimental classes were significantly greater than the controls.

The same subjects who had been matched for the post hoc analysis on survival skills were compared for changes in achievement. Again, statistically significant treatment ($F = 56.57$, $df = 2/16$, $p < .0005$) and interaction ($F = 15.44$, $df = 2/16$, $p < .0005$) effects were obtained from a repeated measures ANOVA.

As shown in Table 4, the control group gained 2.3 standard score units in contrast to the experimentals' 10.6 units from baseline to post-intervention. During follow-up, the controls gained 1.9 versus 6.0 units for the experimentals.

The hypothesis that survival skill increases would result in increases in reading achievement received major support from the present findings. The experimental children made greater gains in survival skills and in reading achievement than was true for the control students. What was of particular import was the fact that the behavioral changes between each assessment period were reflected in concomitant achievement changes for both groups. Where the greatest gains were made in survival behaviors, the greatest gains were also made in achievement scores as well, e.g., the experimentals made the greatest behavioral increase, 24%, and the greatest achievement increases, 28%, during the intervention phase. Likewise, the smallest gains in survival behaviors were reflected in small achievement gains, e.g., the decrease of 16% in survival behaviors for

TABLE 3

Analysis of Variance with Repeated Measures for Mean Achievement on the Gates-MacGinitie Primary A at Baseline, Post-Intervention and Follow-Up for Experimental and Control Students

Source	df	MS	F
Between Subjects			
Groups (A)	1	31.148	< 1
Error Between	16	40.617	
Within Subjects			
Treatments (B)	2	727.255	41.90**
A X B	2	62.016	3.57*
Error Within	32	17.358	

* $p < .05$
** $p < .0005$

TABLE 4

Mean Reading Achievement During Three Time Periods for Experimental and Control Groups Matched on Survival Skill Levels

		Baseline	Post-Intervention	Follow-Up
Controls	$\bar{X}$	40.9	43.5	45.1
(N = 4)	SD	3.4	4.5	4.0
Experi-mentals	$\bar{X}$	38.1	48.7	54.7
(N = 6)	SD	2.2	4.6	3.3

the controls during the follow-up period was reflected in the smallest achievement gain, only four percent. It would appear that changes in survival skills led to changes in achievement.

Discussion

The results of the current study have clearly shown that the intervention procedures were effective in increasing and maintaining survival skill behaviors and that such gains are related to gains in reading achievement. While the continued increase in survival skill level for the experimentals during follow-up had not been predicted, it provided additional evidence of the procedure's power to effect positive change. The findings have practical implications for the classroom and raise a number of questions for further research.

One major question concerns the entire process by which children's improvement is related to their increases in survival skill. Observations of the teachers in the present study suggest that this set of procedures provides a vehicle by which teachers can observe what each student is doing academically as well as behaviorally. It is not a contradiction to state that the group procedure had the effect of forcing the teacher to be consciously aware of children in the class individually and to assess the relevance of her teaching to each child's current level of functioning. It may be that group survival skill training is primarily a setting in which individualized instruction can flourish.

One other major question has to do with the quantity of change. Does a rise of 15 percentage points from the 30 percent level produce the same quantity of achievement change as a rise of 15 points does from the 80 percent level? Previous data by Cobb (1970) suggests that an optimal

level of survival skill functioning may be established for specific academic settings, but that very limited data is currently available to make statements about the minute aspects of the survival skill and achievement relationship. Further research will be required to provide answers to these and other speculations.

Many studies have demonstrated successful intervention in individual school cases. Such a group technique as was used in the current study can be used with the educationally handicapped child, as well as his classmates, and without a seemingly extra amount of effort on the teacher's part. The group procedures may be a viable means for helping most children and thus keep many handicapped children in regular, rather than special, classrooms.

The children in this study were only a small sample of first-grade students who generally would be referred for special services. Indeed, further research is required to determine what percent of educationally handicapped children can be aided by the group technique developed in the present study. At this writing, one of the experimental children, whose response to the intervention procedure was the poorest of the entire group, is receiving special attention for high rates of inappropriate behavior in the second grade. This child has been described as a typical "acting-out, hyperactive" student who constantly disrupts both classroom and playground activity. It may be that such group procedures can be effective for a large percentage of children with a variety of handicaps, but certain children may require more individually tailored programs (Cobb, Ray, & Patterson, 1971).

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